

DIALOG(R)File 9:Business & Industry(R)
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A New Era In Smart Card Security
(Smartcards to offer processing ability equal to a 286 personal computer in 2000; UK looks to have at least 90% of magnetic stripe debit and credit cards switched to smart cards; global use of chip-based cards profiled)
ID World, v 1, n 8, p 45+
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ABSTRACT:

The processing power of some microchips embedded into smart cards in 2000 will be that of a 286 PC, a huge increase from the extremely limited storage ability of early chip cards. The US military is undergoing a major push into the use of smart cards for identification and procurement procedures. Credit card company American Express, meanwhile, has already launched its Blue card, and this project is projecting it will see millions of the chip-based credit cards enter the US market. These cards present a wide range of future options and services for consumers, and the card is being currently positioned for Internet security applications. Banks in the UK, meanwhile, look to have at least 90% of their 84 mil magnetic stripe cards, both debit and credit, switched over to chip-based smart cards by 2002. The use of mobile phones in combination with chip cards is also growing. Standard Chartered Bank in Singapore is partnering with GSM operators in order to issue a smart card that offers the ability for customers to conduct a wide range of financial transactions by phone, such as trading stock and paying bills. Full text discusses the global usage and developments in smart cards, looking at applications and cellular phone services.

TEXT:

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The chip card has been positioned as a key vehicle for safeguarding electronic commerce and point-of-sale transactions, and storing personal identification information. In 2000, several major security and identification projects will be in the spotlight. Their success could expedite the global movement to smart cards by governments, financial institutions and other corporations.

By Dan Balaban

Over the past several years the smart card has achieved growing acceptance

as a powerful tool for security, identification and authorization. Financial card issuers are moving to replace magnetic-stripe cards with chips to reduce counterfeiting and fraud. Chips packing digital signatures are helping to safeguard Internet transactions. Smart cards identify millions of mobile phone users and protect military records.

This activity, bolstered by more powerful microprocessor chips, is vastly different from early days of chip cards, 20 years ago. The first cards only carried a few dollops of memory, enough to store and dispense value when inserted into pay phones. But smart card chips that will be available this year will have the processing capacity of a 286 personal computer, once the state-of-the art computer.

As chip cards evolve, so does the identity and security market. This will be particularly true in 2000, with major smart card-based programs taking shape in Europe, the United State and Asia. If the programs succeed, they could lead to a swifter global move to chip-based identity systems.

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The market on perhaps the fastest track for chip card growth is electronic commerce. Some analysts say the business to consumer Internet commerce market will top \$50 billion annually by 2002. But business-to-business and citizen-to-government electronic commerce is likely to dwarf the consumer market by 10-to-one. A raft of vendors and card issuers are girding to battle for a piece of this much larger pie. Among those already making inroads is Barclays Bank with its Endorse smart card.

The London-based financial institution launched a service that offers safe passage on the Internet for documents ranging from tax forms to e-mail. Barclays began the initiative in 1998 in a 10-month trial with the United Kingdom government. Self-employed persons used Endorse cards, issued to them at their local Barclays branch, to register with the federal government.

The chips stored a digital certificate for each cardholder. It guaranteed to the government that the person filing the form was who he or she claimed to be. Now the bank is taking Endorse to both the business and consumer sectors, which it believes will find all sorts of uses for the product, from securely closing a contract online to identifying buyers of electronic news articles.

"You've got a tool out there that's going to ID an individual to you," says Steven Collins, Endorse project director. "We leave it up to the imagination of the acceptor as to what they could do with their business if that tool was there."

Barclays will earn fees for securing the transactions. For low-risk transactions, the Endorse card may only verify the cardholder's identity by means of a stored password. For higher-risk deals, such as trading stock, Barclays will verify the credentials of the company or individual and accept liability if something goes wrong.

The bank will charge the customer accordingly. A person with an Endorse card could go to a Web site to see all the organizations that accept digital signatures. By securing electronic commerce, Endorse is a single-function card that acts like a multiapplication card, because cardholders can use it for many purposes, Collins says. The real application is online security, which is growing in importance for the smart card industry, says Karen Epper, senior analyst for Stamford, Conn.-based GartnerGroup, a research and consulting firm.

"Security is really positioned to potentially be the application for which smart cards have a use that's going to appeal to consumers and corporate users alike," she says.

More financial institutions also are looking to issue smart cards with digital certificates. Paris-based Le Groupe Banques Populaires, for instance, this year plans to distribute chip cards loaded with digital certificates and encryption keys for use by corporate customers for Internet commerce.

Barclays, meanwhile, recently signed an United Kingdom accounting firm that wants to give clients the ability to digitally sign income tax returns and other documents they send online. That, however, may not help the bank shake Endorse's image as a government-commerce card.

It only obtained the reputation because the government sector has been more aggressive in using digital certificates to safeguard commerce on the Internet, explains Collins. "If you look at the overhead of paper-based services, the savings are enormous," he says. "That applies across the board, not only to the government applications."

The bank plans to license the product in other countries, which it likely will promote without the Barclays name. While that could help Endorse find more customers, Melbourne, Australia-based consultant Ian Povey of PriceWaterhouseCoopers believes it may not be enough to sustain the service beyond the UK. Organizations such as bank card associations Visa International and Mastercard International would have a much greater reach.

"Yes, a bank is the right body to be a trusted third party with digital certificates, but if it wants to go broader, maybe it should be driven by the card associations," he says.

It is too early to say whether Barclays' Endorse initiative can make it in the global marketplace. But as more competitors jump into the market, Endorse is sure to become known as a pioneering project for securing electronic commerce transactions.

The U.S. Government Aims Its Spotlight On Smart Cards

Securing Internet commerce is but one use for smart cards in the electronic society. There are the great masses of employees who log onto their private networks or the Internet at work with passwords they often lose, change or leave lying around on sticky notes. The U.S. government, among the largest single employers in the world, wants to remedy that situation and seems headed toward using smart cards to do it.

The U.S. General Services Administration wants to rollout its Smart Access Common ID smart card to the more than 2 million federal government employees.

The cards would carry digital certificates, which employees would use to log onto their agency's network, to gain access to restricted Web sites, and to digitally sign documents they send over the Internet. With a flash of the cards, which also would function in a contactless mode, they could gain entry to government buildings.

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In addition, agencies from the Central Intelligence Agency to the Social Security Administration could add applications to the cards, from an electronic purse for use in vending machines to storage of medical and dental records.

While the Clinton administration has made deployment of a federal employee smart card by 2001 a goal, it has not allocated money for a rollout. The Department of Defense has \$30 million budgeted for its own smart card programs, which it has pursued separately from GSA. The military, mainly the U.S. Navy, has 100,000 cards in circulation and along with the rest of the DOD, plans to rollout smart cards to all active duty military and civilian personnel (see story, page 5).

Both the military and civilian parts of the government are high on setting up a public key infrastructure to secure their computer networks. PKI uses sophisticated keys to encrypt and decrypt data sent over public and private networks. These encryption keys can be stored on personal computers or other devices, but the GSA and Defense seem to favor using smart cards as the storage devices because cards are more tamper-resistant than PCs, are portable and can carry multiple applications.

"PKI is the main driver," says Larry Carnes, a former project manager in GSA's office of electronic commerce, and now a Crystal Beach, Texas-based consultant. Besides security, agencies also see smart cards as a way to comply with the government's Paperwork Reduction Act, he says. "Within the next two to three years, it's conceivable every federal employee will have some form of Common Access ID."

Should government agencies give the go-ahead for Smart Access, observers inside and outside the government expect many of the cards to carry applications from commercial partners, such as banks or travel service providers.

The GSA already has done this in a pilot that launched last year. GSA joined with New York-based Citibank and Visa U.S.A. to test a multiapplication smart card that lets 400 Washington, D.C.-area employees gain entry to buildings, check out equipment and store electronic boarding passes for tickets on American Airlines. They also can make credit card purchases with an application stored on a magnetic stripe on the card.

The chips carry not only digital certificates, but a digitized record of the employee's fingerprint. To log onto their networks, they insert the cards into readers attached to the PCs and submit to a fingerprint scan.

U.S. officials also have expressed interest in putting a transit application on the cards. The U.S. government, in short, could push adoption of multiapplication cards, not only in the States, but internationally as well.

"The government is definitely an application user that is going to drive the future, outside of banks, through identification, authentication, payments and streamlining of government," says PriceWaterhouseCoopers' Povey. "As more governments realize they can use smart cards, we'll see this happen a lot more."

American Express Beams Into The Virtual World

While the U.S. government is gravitating to smart cards, New York-based American Express Co. has been quicker out of the blocks. AmEx, last September, launched its Blue card, a project that promises to deploy millions of chip-bearing credit cards in the high-profile U.S. market. It also will be used to focus on security for transactions on the Internet (ID World, November/December 1999).

Using their cards and the readers AmEx will provide for free through Jan. 31, consumers will be able to shop online, confident their account number is safe from cyber-thieves. Besides a credit application on a magnetic

stripe, which cardholders can use in the physical world, the card stores a digital certificate on its chip. This electronic ID for the cardholder also will protect AmEx and Internet merchants from consumer fraud because the cards will authenticate each cardholder to the AmEx server.

While some in the industry see the chip as a gimmick by AmEx to steal credit card customers from rivals, it is clear the New York-based financial services giant intends to add applications for use in both the virtual and physical worlds.

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Although AmEx executives are keeping mum about what other services consumers can expect from their chips, the company has worked hard at applying smart card technology to the travel industry for more than two years.

Industry observers expect Blue cardholders, in the not too distant future, to be able to use the chip to download airline tickets they purchase on the Internet. Cardholders also are expected to be able to dictate detailed preferences for airline, hotel and car rental accommodations when they make reservations online. Once at their destinations, the chip will let them bypass ticket counters and hotel front desks.

AmEx also has tested electronic purse applications and bought a stake in Proton World International, one of the world's largest electronic purse technology vendors. AmEx is putting a nearly "blank, empty hard drive in the hands of consumers," notes Alan Goulet, AmEx vice president for smart card technology.

"I don't think we're ruling anything out," Goulet says. "Using devices and smart cards to secure network or any other interaction seems to make a lot of sense, including for the e-purse or to download coupons."

Goulet and colleague Martin Wittwer, vice president, smart card enterprise development, see the Internet as the force that propels Blue into other applications and other devices, such as mobile phones and set-top boxes. And, while they refuse to commit, they suggest that Blue cardholders will use their digital certificates to do more than just buy books or flowers online.

"You could offer an additional level of security for electronic mail, e-auctions, electronic banking," Wittwer says. "You could really expand the card-based security concept."

When American Express announced Blue card, smart card industry observers said competitors would be forced to respond. Sure enough, within weeks, both Visa International and MasterCard International announced electronic

commerce initiatives.

Michael Walters, CEO of Cards Etc., a Sydney, Australia-based firm that builds back-office software for smart card systems, says he is fielding inquiries from bank customers in Australia and overseas about how they can set up Bluelike card programs.

"Banks in Australia and in the United States are concerned that some of their customers will be attracted to (Blue)," Walters says. "And it's customers they don't want to lose."

Banks Step Up The Fraud Fight In The United Kingdom

The American Express Blue card is being positioned for Internet security, but other financial organizations are using chip cards to prevent fraud in the physical world.

They face the challenge of implementing industrywide standards. Besides the Subscriber Identity Module (SIM) card that works in GSM cellular phones, no other smart card application is interoperable the world over. The EMV standard for debit and credit chip cards aims to change that.

Three bank payment associations, Europay International, MasterCard International and Visa International, released the EMV chip card standard in 1996, hoping to do for chip-based debit and credit cards what an earlier standard did for magnetic-stripe cards--gain acceptance for the cards around the globe. Banks in the United Kingdom intend to make their country the first major nation to rollout EMV-compliant chip cards. The financial institutions have sunk UKPd300 million (US\$486 million) into the project, says their industry group, the Association of Payment and Clearing Services.

Led by such APACS members as Barclays Bank, National Westminster Bank and Midland Bank, the British institutions plan to have at least 90% of their 84 million mag-stripe credit and debit cards converted to chip by 2002. The millions of chip cards and hundreds of thousands of smart card readers the British banks deploy will provide the foundation for such other card-based applications as loyalty and e-cash.

The rollout also will make it easier for such service providers as mobile phone operators to accept cards for payment, says Michael Harris, senior vice president of MasterCard's smart card unit. "Clearly, there's some work to be done, (but) there's no question we'll see the ability to use the EMV payment application very widely," he notes.

The UK banks launched the program in 1999 for the same reason French banks

rolled out a chip-based charge card a decade earlier: fraud prevention. Fraud in the United Kingdom was claiming a growing share of revenue--UKPd135 million in 1998, up 11% from the year before, according to APACS. That includes losses from counterfeiting and lost and stolen cards. Chip cards will not remedy the latter category of losses. but by 2003 the banks plan to deploy terminals with personal identification number pads to make it harder for thieves to use stolen cards.

The chip card rollout, however, already has hit some bumps. Although the banks are paying more than half the costs of the chip-ready point-of-sale readers, they are calling upon merchants to foot the bill for the rest. And some retailers are balking. Even without these merchants participating, the banks expect to have more than 300,000 POS terminals in place by 2001.

"The way that APACS and the bank side and the British retailers work this out may be a model for the future," says consultant Duncan Brown, director of research for North America at London-based Ovum Ltd.

Merchant resistance is only one reason European banks are behind on their goal to spread EMV-compliant chips cards throughout Europe, says Philip Andreae, a Brussels-based consultant and former Europay International executive involved in the EMV rollout. He says Europay had set a target of 2002.

Banking officials also underestimated the rollout cost, which could reach \$30 billion, he says. They also changed the specifications in midstream and failed to account for meager power in dual-slot mobile phones, he notes. If the United Kingdom completes the rollout, it will not be until 2005 Andreae says. "They may, because of sheer English pride, do it, (but) it's only going to be mono-application cards."

European banking industry officials are more optimistic, including executives at Europay and MasterCard. EMV rollouts in France, Germany, the Netherlands, Belgium, as well as Japan and other countries, will be underway within three years, they say.

Banks also could put an interoperable e-purse on the cards. It could comply with the Common Electronic Purse Specifications supported by Visa, or be a Mondex electronic purse that is backed by MasterCard, says Herve Kergoat, head of Europay's electronic purse unit.

"In many countries, the card will be combined with a purse," Kergoat says. "They (bankers) are now convinced in Europe that the chip is the basic future technology for their payment cards."

Using Mobile Phones For Banking On The Fly

Financial institutions also are pursuing smart card activity in a host of markets. Standard Chartered Bank in Singapore is joining with GSM operators in Singapore and Hong Kong this year to issue a smart card that lets customers bank, pay bills, trade stock and conduct other electronic commerce, both on and off the Internet, using their mobile phone handsets.

Standard Chartered and the telecoms have formed the Asia Mobile Electronic Services Alliance, along with Visa International, two postal services, three universities and several vendors to promote the new service. They plan to issue 50,000 cards during the second half of this year, which customers not only will use in the second slot of their mobile phones, but also in Internet kiosks and personal computers.

"It's one of the few true multiapplication cards, which is multi-issuer in a super-key area, the whole mobile e-commerce area," says Alyxia Do, an industry analyst for Mountain View, Calif.-based Frost & Sullivan. "You're talking about banks looking to move beyond banking (and) telecoms are having to differentiate themselves in value-added areas."

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The cards will carry Visa-branded credit and debit and an e-cash application cardholders can reload by phone. Cardholders also can choose to load digital certificates onto the cards to authenticate themselves on the Internet. This increases security when they exchange e-mail or conduct other business online.

The mobile phone service providers, Hong Kong's SmarTone and the SingTel Group of Singapore, which together have more than 1 million subscribers, will help Standard Chartered launch the new multiapplication program.

But besides the cross-industry alliance and its focus on electronic commerce, the project is significant because its backers plan to use "open" platform software that many observers believe will usher in the era of multiapplication smart cards. The software, Windows for Smart Cards from Microsoft Corp. and Java Card from Sun Microsystems Inc., is designed to let issuers buy cards and applications from more than one manufacturer or software developer, eventually lowering costs and increasing innovation. A third platform not in Standard Chartered's plans, Multos, from the London-based MAOSCO consortium, claims to offer the same card benefits.

These software platforms, introduced over the past three years, also will make it easier for the financial institutions and telecoms to let customers add new applications to their cards over the Internet or private phone networks. Nicholas Fung, who led the project as head of chip and electronic

commerce, card services and consumer banking for Standard Chartered in Singapore, invited other prospective issuers to join, hoping to attract enough cardholders to make the systems a de facto standard.

GOING CELLULAR

Standard Chartered is not the only bank that sees the mobile phone as a way to offer customers new services. In France, for instance, seven banks joined with France Telecom to launch a pilot in 1999, letting subscribers make purchases from 22 online merchants with their charge cards.

One of Scandinavia's largest financial institutions, MeritaNordbanken, is letting its customers book theater tickets, order flowers, pay for groceries and conduct other electronic commerce using a small credit or debit chip card stored in their mobile phones. The bank, based in Helsinki and Stockholm, has issued a few hundred Visa-branded chip cards for its pilot. GSM phone customers can make purchases without removing the payment cards from the cellular phones, says Bo Harald, MeritaNordbanken executive vice president for payments and network banking.

Phones used in both the Standard Chartered and MeritaNordbanken projects will come loaded with microbrowsers, allowing subscribers to navigate the Net while on the run. The browsers will comply with the two-year-old Wireless Application Protocol (WAP), which lets Internet applications work across various makes of handsets, on various mobile networks and on such wireless devices as pagers and personal digital assistants.

The potential for wireless business, both with smart cards and without, is why MasterCard recently formed a mobile electronic commerce unit and followed rival Visa in joining the WAP Forum, which meets to refine the microbrowser standard.

MasterCard's Harris says banks cannot only focus on traditional point-of-sale and PC-based Internet commerce. "Mobile commerce will follow those two, but could overtake one or the other very quickly," he says.

For MasterCard, the threat is not just from Visa, but also from entrepreneurial companies that will try to steal business away from member banks. "The future model is banks are competing not only against banks, but against nonfinancial institutions," says Frost & Sullivan's Do.

On this score, other institutions are sure to follow Standard Chartered's lead and try to capture mobile business before someone else does.

Keeping Track Of Citizens

Mobile phone applications are just part of a multitude of chip card

opportunities taking shape in Asia. Smart card-based national ID programs also are gaining momentum. Malaysia, with 20 million residents, has one of the largest projects under development with the government planning to issue multiapplication chip cards to citizens.

As with most national identification projects, especially in Asia, Malaysia's program has been delayed. But while proposed colossal programs in China and India seem destined to languish on the drawing boards for years, the Malaysian government appears serious about moving ahead.

"They want to get Malaysia caught up to Singapore and go beyond, to get Malaysia declared a developed nation," says PriceWaterhouseCoopers' Povey, who is working on the project.

The cards will carry a citizen's digitized biographical data and thumbprint, driver's license information, passport number and such vital medical data as blood type and allergies, he says. Meanwhile, banks in Malaysia are testing a separate national electronic purse card based on Proton technology.

Both Povey and Jean-Paul Thomasson, smart card products marketing manager at semiconductor manufacturer STMicroelectronics, Geneva, Switzerland, and St. Genis, France, predict a rollout of the government card starting later this year. That would put it well ahead of other national ID proposals, ranging from 800 million and 650 million card projects being discussed in China and India, to a government "efficiency" card in Ontario, Canada.

The costs of such smart card systems are huge, and that alone will delay or kill many of the proposed national ID rollouts, observers say. Privacy concerns among citizens already have helped scuttle projects in Taiwan and South Korea.

AN EVENTUAL EVOLUTION

National governments that require their citizens to carry some sort of ID card will sooner or later have to upgrade to smart cards or other secure devices if they want to take advantage of savings from doing business with their citizens over the Internet. Malaysia appears likely to lead many of these governments in dispensing with paper, bar codes and magnetic stripes products and moving to chip cards.

These projects illustrate the wide range of identity and security applications being supported by smart cards. As issuance of chip cards expands throughout the world, the product will play an increasingly important role in safeguarding activity in the public and private sectors during 2000 and beyond.

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--File 581 - The 2003 annual reload of Population Demographics is complete. Please see Help News581 for details.

--File 990 - NewsRoom now contains February 2003 to current records.
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To search all 2003 records BEGIN 990, 992, or B NEWS2003, a new OneSearch category.

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\$0.11 Estimated cost this search

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Spread Spectrum: Kmart Installs Wireless RF Network

Robins, Gary

Stores v73n11 PP: 76, 78 Nov 1991 ISSN: 0039-1867 JRNL CODE: STR

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SPECIAL FEATURE: Diagrams

WORD COUNT: 1057

ABSTRACT: A wireless radio frequency (RF) network called Spectrum One now operates in 700 K mart stores and will be installed in all the company's US stores by 1992. Spectrum One is Symbol Technologies' implementation of spread spectrum technology; it offers the ability to support a larger number of data collection devices and the ability to transmit data at much greater speeds. At K mart, Spectrum One's current applications include price verification and inventory ordering, balancing, and counting. Symbol is beta testing at retail sites an add-on, printed-circuit board that will convert cabled point-of-sale (POS) devices into wireless POS devices that will communicate over Spectrum One. Tests are expected to run through the end of 1991, but K mart is not one of the test sites.

TEXT: Kmart will equip all U.S. Kmart stores with a wireless radio frequency (RF) network called Spectrum One, Symbol Technologies' implementation of spread spectrum technology. Spread spectrum technology "spreads" radio frequency signals over a wide frequency range, as opposed to narrowband technologies that remain within a tight range.

The spread spectrum technology offers a number of benefits over narrowband technologies, two of which are of particular interest to retailers: the ability to support a much larger number of data collection devices; and the ability to transmit data at much greater speeds.

The Spectrum One data transmission rate is 60,000 bits per second (bps)--as opposed to narrow-band data rates of up to 9,600 bps--and it can support hundreds of terminals per channel. Spectrum One is already operating in

about 700 Kmart stores and is planned to be installed in all U.S. stores by the end of next year. This marks the first major rollout of the Spectrum One network.

Kmart's immediate plans are to use Symbol's hand-held Laser Radio Terminals (LRT 3800) in conjunction with the Spectrum One network. The LRT 3800s are used for a variety of in-store, data-collection applications. The network, however, was put in place not just to enable the LRTs to communicate faster to a host computer, but to position Kmart with an RF backbone network that could bring about the possibility of a total wireless environment.

David Carlson, Kmart's senior vp-corporate information systems has called spread spectrum a strategic direction. Spread spectrum's ability to transmit large amounts of data quickly and to operate with a large number of terminals means that the network can support both traditional hand-held devices and wireless point-of-sale (POS) devices.

Says Carlson: "While we have no plans to implement wireless point of sale broadly across the chain, if you are putting in brand new equipment, it seems strategically appropriate that you put in equipment using technology that could be employed for other things if the requirement presented itself."

Symbol is beta testing at retail sites an add-on, printed-circuit board that will convert cabled POS devices into wireless POS devices that will communicate over Spectrum One. The add-on board, developed in conjunction with Post Software International, was internally tested by PSI on three major POS platforms: IBM 4684, NCR 7052 and Fujitsu Atrium 9000.

Tests are expected to run through the end of the year, but Kmart is not one of the test sites. Kmart's Carlson emphasizes that Kmart has "no current plans for wireless POS." Carlson notes that his area has its plate full at this time with the installation of 20 to 30 stores a week with a new Intel 486 computer made by Unisys plus the installation of the new Spectrum One network.

Carlson, however, is conscious of the possibilities for wireless POS. While

a front-checkout environment might at first appear to have limited possibilities for wireless POS, the opposite is true.

"There are far more opportunities for us than one might imagine: everything from truckload sales in the parking lot to special displays in the midway. It provides a very flexible selling environment," he says.

Kmart first installed the Spectrum One network last spring. By the end of July, with more than 200 stores installed and using the system, Kmart felt confident the system was going to perform as expected. It is using three LRT 3800s per store.

Were there any problems with the initial rollout? Early on, notes Carlson, there were some minor issues related to coverage--dead spots in remote parts of the store. This occurred in some previously owned buildings that were not constructed by Kmart, where there may have been a large concentration of metal or a stockroom that was actually a built-on addition.

For antennas, Carlson indicates that the initial version of the RF system required an average of 3.5 per store. A subsequent version has brought the average down to 2.5 antennas per store, with the maximum number at 4. "The maximums," says Carlson, "have far more to do with the construction of the building than the square footage of the building."

Has the new system resulted in faster response time? Carlson explains that the response time is a function of several different segments. The signal is carried from the hand-held, to the antenna, to the base station, across a local area network, to the in-store processor to access the application and the database, and then back again.

Many of the segments lie outside of the RF system itself. Carlson says: "We know that it is faster. We also know that the speed of the processor and the efficiency of the database are important ingredients in the response time. It appears faster to the users, but you can make it appear faster by tweaking the database."

Although the Spectrum One network can handle greater data transmission rates, Kmart's current applications do not take advantage of the additional capacity. The current applications, which Carlson describes as "not demanding," are price verification, inventory ordering, inventory balancing and inventory counting.

While Kmart has not yet pushed the limits of the technology, Carlson acknowledges that other applications are in the works on which he cannot comment.

In addition to wireless POS, some retailers are considering the possibilities of what has been called portable POS. This involves a hand-held scanning unit functioning as a POS device that could perform some combination of price look-up, transaction capture, receipt printing, and even credit authorization by way of wireless communication with the in-store processor.

Escorted shopper programs, sales coverage in outdoor locations, and scanning prior to checkout are some ideas that have been tossed around for portable POS.

Richard Bravman, Symbol Technologies vp-marketing, commenting on the possibilities for a total wireless store, says: "We are still learning just how broad applications for this concept can be. The notion of a wireless store environment, in terms of the business implications, can not yet be fully appreciated."

He continues, "nobody has yet thought through what one can do in a merchandising sense if you have the ability to flexibly deploy point of sale, either in a portable form or in a highly transportable form. There will be a great deal of creativity over the next year, some of which will involve new technology and some of which will involve exploiting the technology that has already been brought forward with new business strategies."

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Retail Systems: No Longer Business as Usual

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ABSTRACT: Among the most critical changes a retailer must make to build its strength and guarantee its survival are those involving information and technology. In marketing, retailers can use systems to analyze external marketing information databases and to gather data about frequent and target customers. In the store, technology can expand a retailer's ability to offer customer service functions at the point of sale and at the point of decision. In merchandising, productive use and management of data enables retailers to perform quick response replenishment, continuous merchandise planning, and flow-managed distribution. To get the full benefits of technology changes, retailers should: 1. design their systems for desired results, 2. encourage user participation and accountability, 3. establish defined milestones and measures, 4. secure commitments early to develop a sense of urgency and momentum, and 5. maintain a sustained push from management.

TEXT: Among the most critical challenges a retailer must make are those involving information and technology. A visionary, yet practical strategy can position a retailer to use technology to meet its primary objective: knowing and serving its customers. Not only can information technology help retailers listen more closely to their customers, it also can enable improved quality and customer service. Information technology often carries with it the positive image of innovative leadership. But technology must do more than look good. Above all, it must be purposeful and integrated: Each addition to a retailer's technology plan must link with its existing systems to support a meaningful strategy formulated to meet specific challenges.

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STRATEGIC FORCES A retailer's challenges come from various fronts. In particular, retailers are investing in improved technology to rise above the forces exerted by their consumers, competitors and vendors.

CONSUMERS. The weak economy has slowed consumer spending and resulted in flat meet growth. But at the same time, consumers expect retailers to offer more convenience, greater value, improved service and increased quality. Retailers also face America's changing demographics: As the nation's "graying" population and the "baby boomers" and their children rise in spending power, their lifestyles and buying patterns influence the retail business. Furthermore, consumers are demanding that retailers rise up to meet their environmental and wellness concerns.

COMPETITORS. In the 1980s, retail store operations flooded America. The amount of retail space in the United States has doubled since 1970; for every U.S. citizen, we have 18 square feet of retail space. And we are witnessing an ongoing shakeout of faltering organizations that cannot compete. The industry's leaders--who focus on building market share and differentiating themselves from others--are moving far ahead of the rest.

VENDORS. Retailers are beginning to establish strategic partnerships with their vendors, such as manufacturers, mills, wholesalers, distributors and carriers. As the market becomes more global, retailers must choose their partners from a broad array of vendors around the world. Battling continued cost pressures, they are encouraging vendors to help cut costs in the retail pipeline, eliminate wasted time and improve quality.

RESPONDING TO NEW DEMANDS To be responsive to these market forces, retailers need information systems that enable them to accurately predict and effectively react to trends. Traditionally, retailers have focused on organizational growth and expansion to new locations. But today's sluggish market dictates that retailers focus on the consumer, not the competitor; it is imperative that they shift their attention to who their current and potential customers are and how to reach them. This shift requires retailers to become smarter about collecting and using consumer information to generate profits.

Careful examination of data may show retailers that adding new stores is often not as profitable as shifting existing resources to better target sales. The right data could help determine how a retailer should reposition for greater profits. This data should communicate not only who customers are, but also where they are, what they need and how they spend. The key is to collect this information at the point of sale and process it quickly so it can be used to support the entire retail pipeline, beginning with the buying function and ending at the selling floor.

In marketing, retailers can use systems to analyze external marketing information databases and to gather priceless data about frequent and target customers, such as customer-specific transaction information. Through a variety of new technology applications, they can improve direct marketing skills and increase their capabilities to offer customers home shopping options. Most importantly, information systems can help retailers shift their focus from "what's selling" to "who's buying," and can create a process where consumers "pull" goods through the pipeline as they want them, rather than having merchandise pushed at them by retailers and manufacturers.

In the store, technology can expand a retailer's ability to offer customer service functions at the point of sale (POS) and at the point of decision. Stores can install customer-operated service terminals for product information, gift registry and orders, or portable POS devices enabling sales associates to take the sales function to the customer or to ease the traffic problems of peak sales seasons. Retailers might also institute a technology-driven frequent shopper program that not only offers customers benefits, but also enables the organization to capture valuable shopper information to refine marketing efforts. Technology can be used as a information tool to empower personnel to make decisions regarding merchandising and customer service. Further, smart systems and workstation-based technology can strengthen the capabilities of the store-level management team.

Retailers must also strive for efficiency by ensuring that every business process is "value-driven." The goal is to work smarter: better, faster and

cheaper. One means to this end is to use technology as a productivity tool that cuts waste and improves quality and value to the customer. For example, retailers traditionally have used a variety of replenishment techniques to get items as far as the store back room, but not all the way to the shelf. Quick Response technologies can help speed products to the shelf. But the information system that supports replenishment must be "smart" enough to do this, and the retailer needs a strong communications backbone to ensure information flows through these systems effectively.

In merchandising, productive use and management of data enables retailers to perform quick response replenishment, continuous merchandise planning and flow-managed distribution. They can implement systems to refine inventory management and restructure work to facilitate pooled clerical support. Through effective process reengineering, retailers can make buying more strategic, freeing the merchandiser's time to define the right merchandise for the market.

In logistics, information systems can help distribution centers manage the increased volumes needed to ship to every store everyday. Retailers can use advance shipment information to schedule and consolidate inbound and outbound freight and to automate material handling equipment. They can also reengineer processes to handle increased volumes of smaller transactions--a direct result of any move to Quick Response.

Retailers have begun to evolve strategic partnerships with vendors. Many retailers are implementing initial programs with first-tier vendors, and the leaders are moving toward additional, "deeper" vendor relations. All retailers expect these partnerships to improve their business and their success with customers. While these relationships typically have been driven by the retailer, retailers and vendors now must cooperate to make their partnerships mutually successful. They must work toward a shared goal: anticipating, meeting and exceeding customer expectations. To do this, both members of a partnership must:

1. Secure senior management's commitment and establish mutual trust.
2. Facilitate communication between the companies across all functional areas (including sales and marketing, production, distribution, logistics,

accounting and MIS)

3. Develop a mutual understanding of each other's business and culture.
4. Focus intently on early successes.
5. Work together to reengineer merchandise flow processes.
6. Implement enabling technologies, such as electronic data interchange (EDI), universal product codes(UPC) and shipping container marking(SCM).
7. Monitor performance and make ongoing efforts to improve.

To meet all these business challenges--for consumer-driven marketing, value-driven operations and strategic partnering --retailers can use information and technology. They must apply technology strategically to every facet of their business.

THE IDEAL TECHNOLOGY VISION To meet their business challenges today and tomorrow, retailers should look for opportunities to grow into the following key technology visions:

Computer systems that are as accessible as the telephone and provide users access through a variety of terminals. The location of both user and computer is becoming less and less important as an almost universal communications network bridges geographic gaps.

Natural computer interaction that mimics the user's human senses. The ultimate intuitive interface will feature multimedia communication, transmitting image, sound, full-motion video and text, employing both voice and handwriting recognition.

Smart systems that go beyond recording and reporting data to be intelligent "agents" that identify a wide array of actionable conditions. To support customer service, smart systems apply knowledge-based logic to suggest or take appropriate actions to conquer business inefficiencies.

New-age client/server architectures that can manage the proliferation of

information and growing transaction volumes with a composite of scalable, open technologies,

TECHNOLOGY AT ALL ORGANIZATIONAL LEVELS All these technology visions have direct application possibilities for retailers. Retailers must apply these technological "ideals" to systems that will help their personnel at all levels to better serve customers in the present and predict market demands to assure customer satisfaction in the future.

At the store level, retailers might apply technology in the form of wireless POS devices, a store manager's workbench, a work force scheduling system, computer-based training for store employees or customer information systems that capture and manage data to enable better marketing and merchandising.

At the distribution center, a retailer might use systems for the center's management, work force scheduling, freight optimization or material handling automation. Distribution centers can profit from paperless and portable systems and Quick Response interfaces that enable them to move goods at the right time, in the right amounts, to the right place.

At the corporate level, retailers might adopt technology to aid in merchandise planning, quick response replenishment, vendor relationship management, market analysis or promotion planning and execution. In addition to "workbench" applications for merchandisers, buyers and planners, the corporate organization could use multimedia electronic mail to improve communication with both internal personnel and external suppliers.

Technologies to Watch Several important technologies are emerging that retailers can implement to achieve their strategic goals. The following are among the technologies to watch in the retail industry:

MANAGEMENT WORKBENCHES. At the heart of any retail organization are its management users. For example, store managers need to be equipped with information that enables them to run not just an operation, but a business that may do millions of dollars in business each year. The store manager must be all things to all people--personnel manager, customer service

manager, profit manager, local marketing manager, relationship manager and merchandiser. To free their time and improve their business capabilities, retail organizations must provide their store managers with smarter systems--exception-driven systems that can scrutinize problems and recommend solutions by giving actionable options. Workbench systems could classify merchandise by profitability contribution so the store manager can monitor a product's success, then choose from "best case" solutions for those products that do not meet expectations.

New-age architectures, artificial intelligence and knowledge-based systems are among the tools that make these workbenches possible. Store managers can use artificial intelligence to focus their operational decisions. A store manager's workbench might feature a "to do" list, as well as the ability to monitor key performance indicators and perform what-if analyses. Store managers should be able to measure the buying habits of their frequent customers. Technology may also enable them with a space management tool that analyses the effectiveness of store ad shelf layouts, then prints out a display diagram for employees to follow when stocking shelves and arranging displays.

NEW-AGE SYSTEMS. New-age systems use intelligent workstations to provide solutions to business problems. They broadly encompass open systems, client/server and cooperative processing. Workstations will enable retailers to automate information gathering and delivery and to increase the flexibility and mobility of their work force. An open systems approach will link together previously incompatible hardware and software. Cooperative processing will change the way people work, letting them focus on the business rather than the underlying technology.

POS DEVICES. A variety of new POS devices are available that can not only collect information, but also help retail personnel manage information more easily and meet customer needs more quickly. For example:

A portable POS terminal scans the SKU (stock keeping unit) symbol on a product, features a credit card swipe for on-the-spot credit authorization or payment, and immediately produces a receipt. Such a device brings the checkout to the customer, eliminates checkout delay and is helpful in peak

seasons and in such departments or businesses as lawn and garden and lumber.

A pen-based POS notepad helps reduce fraud by electronically capturing, recording and verifying signatures.

"Talking shelf tags" inform customers about products on display. The customer simply pushes a button to learn more about a product and make a more informed purchase decision. Not only is this technology informative, it makes shopping fun and relieves busy sales people.

A portable, pen-based notepad is used to survey customers leaving the store without a purchase. The customer answers open-ended questions such as "What do you like about our store?" and "Why didn't you buy anything today?" The system digitizes the respondent's answers, captures the information and enables the retailer to continuously improve, building the customer base by targeting unreached consumers.

ELECTRONIC DATA INTERCHANGE (EDI). EDI, which enables retailers to electronically transmit orders and a wide variety of other transactions, can help eliminate non-value-added processing--a critical move when a retailer processes millions of transactions each year. Establishing a department devoted to partnering and EDI processing is a wise investment.

If EDI is working well, it is invisible. Beyond ordering and invoicing applications, retailers can use EDI to help reengineer business processes with vendors, which can help the vendor improve planning, production and logistics, as well as generally improve the retailer/vendor relationship. The mutual benefits of sound retailer/vendor partnerships bolstered by EDI include improved sales and reduced costs for both parties.

COMMUNICATION NETWORKS. Because a retailer's information must flow throughout a dispersed network of stores, distribution centers, offices and even outside parties, communication networks are key. To present its best image to customers, a retailer needs information that is always up to date and technology that enables quick service. For example, customers asked to endure a long wait for credit card verification cause the check-out line to grow; when that line is long, people will begin to leave without

purchasing.

Traditional terrestrial, or ground-based networks can support most of a retailer's basic communication requirements, such as credit and payment authorizations and EDI. But most retailers have other systems for voice, electronic mail, facsimile and image exchange. VSAT and ISDN networks, which exchange data in a variety of digital formats (data, video and voice) are taking up the increasing demands for multimedia information transmission and rapid data exchange and verification. The challenge for retailers is to implement an integrated, open communications network that supports all communication methods seamlessly, both within the retail organization and externally with vendors, carriers and financiers.

BAR CODE SCANNING TECHNOLOGY. The scanners used to collect SKU data are improving so item scanning is faster and more accurate. Once SKU data is scanned and entered into an information system, retailers can tie it to customer data to learn which products are selling to whom.

Another development in scanning technology is the two-dimensional bar code, which holds much more information than standard bar codes. A high-speed scanner reads the two-dimensional code in a zigzag pattern that covers the entire area of the code, as opposed to the one-dimensional method that simply scans once across a code. Thus, the two-dimensional bar code is essentially a portable data store that can carry much more than simple numeric identification information. It can hold data about what a product costs, where it came from, where it is going and how it should be handled en route.

RADIO FREQUENCY (RF) NETWORKS. To capture and verify data at distributed locations, retailers traditionally have used terminals with hard-wired communications lines, or they have used stand-alone devices that offer only limited verification and storage capacity. Wireless, RF communication provides retailers with data capture devices that are portable, powerful and allow real-time verification and update. The RF network enables the retailer to use hand-held devices to:

Change prices on the selling floor or in the store back room.

Record sales at the point of decision, then hold transaction information in

the system until the customer reaches the register to pay.

Access information on sales statistics, customers and other stores directly from the selling floor.

Provide effective customer service, putting information in the hands of the sales associate.

CARD TECHNOLOGY. One of a retailer's most critical technology needs is for information systems at the point of sale to capture customer and sales information. Proprietary credit cards and frequent shopper cards can be a good source of consumer data. When one of these cards is "swiped" through an in-store POS device, the retailer can instantly capture information such as name and address and link it to the purchase decisions of the consumer. The issue of data privacy is alive and well in the minds of consumers, so retailers must be smart and thoughtful about how they use the data they gather. But the retailer can use this information to target specific marketing to each consumer.

Most of today's cards contain only static data. Transactional information must be stored at remote locations, increasing storage requirements and access time. The emerging breed of "smart" cards allows data to be stored, modified and accessed right on the card. Smart cards allow retailers to inexpensively and readily gain access to changing customer buying information.

ELECTRONIC TEST MARKETING. Test marketing is a traditional means of obtaining consumer feedback on merchandise, but it is expensive and time-consuming. To improve responsiveness, retailers can use information systems to design a range of products online, then share that design with customers and solicit their feedback electronically via in-store kiosk technology. In this way, before the product is even produced, the retailer can obtain consumer feedback to estimate demand for merchandise before making any commitment to vendors.

For example, a multimedia kiosk can be equipped to demonstrate product options to the customer, then invite the customer suggest changes, rank color, style and fabric preferences and even order products on the spot.

The key to successful implementation is that the technology provide value to the customer, such as product information to make an informed purchase decision, while collecting customer data for the retailer's marketing initiatives.

GEOGRAPHIC INFORMATION SYSTEMS. A geographic information system (GIS) is another tool that can enhance retail marketing. Combined with demographic databases that sort existing customers into such categories as lifestyle and region, a GIS pulls information from the point of sale, then plots both actual and potential customers on a map." Using smart system technologies, the GIS then can advise a user with options and initiate the user's chosen action. To back up a user's selections, a GIS can even offer profit projections and stocking requirements to expect with each alternative. Applications of the GIS include determining where to go when changing store locations, learn the customer demographics of stores not meeting expectations, fine-tuning the merchandise mix, improving sales, maximizing the profitability of each existing store and examining the success of media advertising and direct marketing efforts.

FUTURE STRATEGIES As consumers demand more and more convenience, retailers will need to explore new avenues for business growth and improved competitiveness. One valuable strategy will be non-store retailing. Non-store retailing is growing at an average rate of 25 percent each year. While it represents less than ten percent of total sales, high sales seasons such as holidays demonstrate the popularity of home shopping. Catalogs and home shopping networks could be a great source of revenue growth for retailers in the future.

Non-store retailing is changing--moving from massive, non-interactive, non-targeted catalogs to interactive and specific media like Prodigy/, which offers a home shopping service, but limited visual appeal. Televised home shopping programs have tremendous visual appeal, but allow little consumer interaction. An alternative that combines the best of both worlds will be the answer for non-store retailing.

Way down the line is "virtual reality" technology. Virtual reality will

require more bandwidth, advanced chip technology and great graphics capability, but it will enable true home shopping. With virtual reality, a customer could "try on" hundreds of suits from stores around the world in a virtual environment. Retailers and their vendors will create and immediately deliver products on customer demand. For example, a technology is now in development that will enable clothing retailers to offer made-to-order garments. This technology provides for the customer to be measured by laser and the clothing to be made to fit his or her exact specifications.

Meanwhile, in the realm of catalog retailing, direct marketers have moved to more specific catalogs that target consumers more carefully. To further improve, these marketers can use the data they collect to produce catalogs tailored to region or interest. The next step will be to tie the catalogs to customer information, tailoring each catalog to each consumer and his or her buying patterns.

THE EVOLUTION PROCESS Rather than a "big bang" approach, the key to migrating to these new technologies and systems is a phased approach that paces the changes to balance system reuse with system renewal. To get the full benefits of all changes, retailers must:

Design their systems for desired results.

Encourage user participation and accountability.

Establish defined milestones and measures.

Secure commitments early to develop a sense of urgency and momentum.

Maintain a sustained push from management,

When changing business processes to work more effectively and efficiently, retailers should focus on quality, speed and value. Above all, they should ask "What would the customer want us to do?" With the processes properly defined, a retailer can begin to apply technology that is appropriately scaled to the business and the application. Retailers must build information systems on proven, best of breed technologies and encourage extensive user participation throughout development.

By strategically evolving their systems to incorporate this new information technology vision, retailers will open themselves to improved business practices. Information systems can provide them with the power and flexibility to support consumer-driven marketing, value-driven operations and strategic partnering. Most importantly, retailers that make wise technology investments will be better equipped to meet and respond to the changing marketplace.

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Credit Transactions

Robins, Gary

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ABSTRACT: Regional Bell operating companies (RBOC) have been putting equipment in place to handle 2 new services that provide access to their public packet networks: Digital Data Over Voice and ISDN. These technologies enable a single telephone line to simultaneously handle both voice and data traffic. Both technologies provide credit authorization time of less than 10 seconds. The RBOCs' efforts are motivated by projections that show the number of point of service transactions growing dramatically in the next 10 years. Other transactions also will become more common, including debit, check authorization, medical claims, and electronic benefit transfer. The RBOCs' public packet networks will be an inexpensive and fast solution to handle these transactions. ISDN has much potential, but has seen little use as yet. One problem is that service is far from ubiquitous, which reduces demand. A compounding problem is that it represents a major investment in equipment for the telephone companies.

TEXT: Due to the particular characteristics of the telephone industry in the United States, there has been a traditional dichotomy in the retail world: those retailers who can afford leased-line service and those who can't.

The problem has been that there were no services available in between. Smaller retailers have been forced to make do with dial-up telephone service, which, although relatively inexpensive, is about as slow as you can get for data transmissions such as credit authorizations.

Several offerings have been in the works for the last couple of years, but have been delayed because of testing, tariffs or the expense of placing the technology building blocks in many parts of the country.

One of the key building blocks that has been missing in this country--although available elsewhere--is public network to carry data nationwide.

Large data networks often employ a technology which packetizes" data, referred to as "packet-switched" networks. This technology has been in use for many years and refers to an efficient method of breaking down--packetizing--data into smaller bundles and finding the quickest route for each bundle.

Although the Regional Bell Operating Cos. (RBOCs) have packet networks, they have not been major players in carrying transactions for the retail POS industry.

Another key building block is providing fast, digital access to the packet network. The RBOCs have been putting equipment in place in the last several years to handle two new services that provide access to their public packet networks: Digital Data Over Voice (DDOV) and ISDN.

These technologies enable a single telephone line to simultaneously handle both voice and data traffic. Both technologies provide credit authorization times of less than 10 seconds. The promise is that not only are these services fast but also will be available at a relatively low cost.

By the end of this year, we may see the public packet-switched networks in a position to offer the best price/performance for network access.

"We offer a national solution," says Bell Atlantic's Bob Baublitz, project leader for transaction services applications.

There has been a serious effort to address the POS markets. This was evidenced in May when Bellcore published a special protocol called T3POS that was designed to increase the speed of transactions originating at POS

and carried over a public packet network.

The new protocol grew out of the trials BellSouth held for a data-over-voice service, but the protocol is compatible with other access methods such as ISDN. The protocol is also designed to work with POS terminals already in use.

The RBOCs' efforts are motivated by projections that show the number of POS transactions growing dramatically in the next 10 years.

Not only will the number of credit transactions increase, but other transactions will become more common, including debit, check authorization, medical claims and electronic benefits transfer.

If all predictions hold true, the RBOCs' public packet networks will be an inexpensive and fast solution to handle these transactions.

"What we are selling here," says Baublitz, "is a data funnel so that you don't have to have different ports for your front-end processors, be they national or LATA-wide."

In the near future, maintains Baublitz, it will be much easier to set up a data network. Typically, a large company such as a credit authorizer would have had to maintain some type of processor in a LATA with multiple communications ports incurring multiple port charges. Under the packet network, the company needs just one port into the network.

Since the RBOCs are restricted to intra-LATA traffic, connectivity is a critical issue. The RBOCs have adopted widely-used, international standards referred to as x.25 and x.75. Once the data is in the LATA packet network, the standards enable it to be handed off without a problem to an interexchange carrier and then to its final destination and back.

This means that there will still be dial-up for low-end customers, private leased line at the upper end, but there will be an assortment of alternatives in the middle to access the public packet network.

With the addition of a device called a data/voice multiplexer, a single

telephone line can simultaneously handle voice and data traffic.

This technology was first field tested in 1990 by BellSouth, J.C. Penney Business Services, Northern Telecom VeriFone and Integrated Network Corp. (INC, Bridgewater, N.J.), the manufacturer of the multiplexer system.

Six Citgo gas stations participated in the trial. The service, called FAST-CONNECT by BellSouth, successfully reduced authorization time to an average of eight seconds (STORES, September 1990). Pacific Bell and BellSouth successfully conducted subsequent trials of this technology.

The service works in conjunction with the public packet network service offered by the RBOCs. Each call over the line, either voice or data, is sent to the telephone company's central office where the voice signal is routed to the voice network and the data signal routed to the public packet network.

As it stands now, Pacific Bell has the data-over-voice service tariffed for California and BellSouth has it tariffed as of April 27 for Florida.

According to BellSouth, one Florida restaurant is now using the service and is experiencing average authorization times of about 10 seconds. The cost for the service is an additional \$17 a month for the derived data channel on top of the existing business voice line, but there are additional costs. J.C. Penney Business services plans to conduct extended data-over-voice beta tests this summer. The intention, according to Gary Jones, J.C. Penney Business Services' manager of communications technologies, is not to test the technology again but to make sure the management tools are in place support the service.

Jones adds that J.C. Penney also is looking at other technologies to make use of that LATA-based packet network. One is ISDN, which Jones credits with a lot of potential but may take time for the RBOCs to deploy.

Says Jones: "ISDN is where the phone companies are headed, they are not headed toward data-over-voice. I see data-over-voice filling the void where I don't have ISDN at a wire center. A phone company can equip a wire center with data-over-voice for a lot less expense than ISDN. ISDN has a long way

to go to be widespread, and if the ISDN rollout is not going to be fast enough, data over voice can fill the void."

Northern Telecom, which supplies RBOCs with the digital equipment that enables data-over-voice or ISDN service, indicates that the virtual private line provided in data-over-voice is similar to ISDN, so it can be a forerunner to ISDN. Customers can migrate to ISDN when it is feasible. ISDN has a lot of potential, but has seen little use as yet. One problem is that service is far from ubiquitous, which reduces demand. A compounding problem is that it represents a major investment in equipment for the telephone companies, and they cite lack of demand as a reason for not making it ubiquitous.

Two RBOCs have been more aggressive than the others when it comes to ISDN: Ameritech and Bell Atlantic. Ameritech's strategy is not to go in the direction of data-over-voice but instead toward ISDN. Ameritech has spent half a billion in Michigan, for example, to make that network digital.

Bell Atlantic's penetration of ISDN is highest of all the regions. By 1994, the company plans to have close to 90% of all the network access lines able to run ISDN.

According to Bell Atlantic's Baublitz, ISDN will be fast and inexpensive. Bell Atlantic has clocked transactions from the East Coast to a host on the West Coast and back in five seconds.

Of the costs, Baublitz says: "It will be about \$300 to install, about \$10 for the enabling equipment per month, the ISDN is about \$18 a month, and the transaction cost is about a penny per transaction." He expects approval on the ISDN tariff this summer. Bell Atlantic has put together an ISDN service designed especially for retailers.

A lower-capacity service of ISDN, the Basic Rate Interface, contained three channels: two B channels that can carry 64,000 bits per second of digitized voice or data and one 16,000 D channel for signalling. The new configuration is one B channel and one D channel.

Explains Baublitz: "Although the D channel is typically used for signalling, the signal is so minor that you can derive a 9600 channel for the transactions. If a company already has two lines, it would get rid of one measured business line, and on top of the other it would add ISDN."

J.C. Penney Business Services will test this version of ISDN this summer. Says Penney's Jones: "It is our intent to do an extended beta test of ISDN with at least one Bell operating company in 1992.

"Some of the Bell operating companies are tariffing what is being referred to as single line ISDN, in which there is only one B channel, and that is being put together specifically to address the POS market. What we are looking at doing in phase 1 is simply using the D channel for the data and the B channel for the phone service."

Ultimately, ISDN would not just be for credit authorization but for all data traffic, both to and from the host.

"A lot of retailers I talk to," says Baublitz, "are at the limit of the number of stores they can poll in one night, because it takes so much time. If you do it 9.6 rather than 2.4, which they can do with ISDN, it can be faster and less expensive."

Baublitz notes that retailers are seeing a lot of possibilities with ISDN. "With ISDN," he relates, "they can combine two B channels and send compressed video out to the stores, so they can update video kiosks."

WIRELESS SOLUTIONS: The idea is a good one: set up antennas in major metropolitan sites that can receive signals from a radio modem attached to a data terminal, like a retailer's POS authorization device.

The problem in this approach has turned out not to be in the technology but in setting up a nationwide network of antennas, which is not an inexpensive proposition.

But antennas are already set up on a nationwide basis for the cellular telephone business. Several companies are already investigating the possibilities of using this existing network, and some even have products

available.

In April, VeriFone, headquartered in Redwood City, Calif., introduced its Mobile Merchant, a battery-operated authorization terminal that uses cellular telephone networks in the same manner as a car-phone. An optional handset can be purchased and the device can double as a cellular phone.

A credit authorization transaction is placed in the same way as on a standard VeriFone terminal. VeriFone reports that transaction time is in the 20-second area.

Some units have been placed in mall kiosks, at fairs, with vendors in the lobby of a concert hall, with a helicopter-ride service and with a tour boat.

The VeriFone product uses the cellular network in the same manner as a telephone, which is subject to the call set-up delays and inefficiencies of a voice network.

A Mountain View, Calif.-based company called Cellular Data has developed an alternate method of sending data transmissions over the cellular network by taking advantage of a previously unused portion of the cellular spectrum. Cellular Data provides a packet data network over the cellular infrastructure.

As with other packet-data networks, there is no call set-up time, so response time is faster.

Cellular Data was founded in 1988. GTE Mobilnet conducted a field trial of the technology in 1991 to see if there was any interference with cellular voice traffic.

The results were that voice interference could be avoided if there is careful coordination of the cellular frequencies. Another trial successfully sent data over the GTE Mobilnet's network to the TYMNET network for routing and processing.

Still another approach to taking advantage of the cellular infrastructure will be tested this summer. That is when a group of nine of the country's largest cellular carriers will test a data-over-cellular technology that sends data over idle cellular channels.

The technology, which was developed by IBM and called CelluPlaN II, will be proposed as an industry standard if tests are successful. Sears Technology Services is the first to announce that they will test the technology.

ACCENTUATE THE POSITIVE

CHECK READERS CAN IDENTIFY CREDIT-WORTHY CONSUMERS

Check reading equipment, devices that can read the MICR number on a check at the point of sale, has been available for several years and has been steadily gaining in popularity as the technology improves.

Similar to the benefits of UPC scanners, the check readers provide faster checkout service and more accurate data capture. And just as scanned tickets led to UPC-level information, the possibility exists for check readers to lead to customer-level information.

To speed the process further, Telecredit Service Corp., a check authorization and guarantee service owned by Equifax, has implemented a positive file that is used in conjunction with the traditional negative file.

Cindy Mazza, director of marketing for Telecredit, notes that "at this point, we have more than 40 million good check writers on the positive file." These consumers are exempt from being reviewed for referral under Telecredit's fraud parameters, which can slow the process at the point of sale. With the help of Equifax, Mazza explains, Telecredit expects to have 80 to 90 million consumers on the positive file, with 30 million of those identified.

"There are tremendous implications for the retailer" she says, "because if we have the ability to identify these people as name and address, there is

marketing data that can be fed back to the retailer."

The positive file is in use now, but the marketing capabilities are under development. Consumer privacy issues need to be addressed before the service can begin.

"The emphasis of Telecredit for the 1990s is to focus on the consumer," says Mazza.

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Three Leading Keyboard & Point-of-Sale (POS) Manufacturers to Integrate
Biometric ID's Advanced OEM Fingerprint Verification Devices

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Ingenico, Key Source, and TIPRO Have All Selected Veriprint Technology
From

Biometric ID for Integration Into Their Respective Devices

SHERMAN OAKS, Calif., June 11 /PRNewswire/ -- Biometric
Identification, Inc. (Biometric ID), a leading provider of fingerprint
identification systems, announced today that Ingenico, Key Source, and
TIPRO have selected its embedded OEM fingerprint verification modules for
integration into their respective product lines.

"The adoption of our OEM biometric modules by these leading
manufacturers is yet another strong endorsement for the use of Biometric ID
technology in support of keyboard and Point-of-Sale(POS)-based fingerprint
verification," said Bob Kamm, President and CEO of Biometric ID. "We are
pleased to welcome Ingenico, Key Source and TIPRO to the group of over
fifty organizations that are integrating our cost-effective embedded
fingerprint verification modules into their product lines. With such
growing support for biometric technology at the embedded hardware level, we
firmly believe that an excellent market opportunity is now emerging for
those software vendors that choose to add support for this technology to
their applications."

Biometric ID's product line includes a range of OEM fingerprint
recognition modules smaller than a business card that reliably verify an
individual's identity in less than a second. Each individual product set
employs "Ridge Recognition(TM)", the company's fingerprint verification
algorithm which leverages 20 years of experience designing high-tech
systems for the Department of Defense. This patented technology uniquely
adjusts for real-world conditions such as the effects of swollen, aged,
dirty, scarred or cut fingers, the main pitfalls of other technologies.
Standalone devices are also available from Biometric ID for those
situations, where a host computer is not available or not considered
secure.

"We chose to work with Biometric ID technology because it is
inherently more flexible, while also being more cost-effective than
alternative solutions," said Andrej Zupanic, Product Manager of TIPRO. "We
particularly appreciate the Image Sensor Interoperability that Biometric ID

offers, because it doesn't restrict us to the use of any one sensor manufacturer or type of imaging hardware."

"We adopted the use of Biometric ID technology because they are clearly an established leader in the biometric industry," said Gerard Compain, Managing Director of INGENICO Group. "We selected the MV 1100 fingerprint verification module because it is based on field-proven biometric technology, and it provides us with the flexibility to use virtually any sensor component that we want to employ."

"The Biometric ID technology enables us to add another dimension of value to the keyboard-based products we can offer our customers," said Phil Bruno, V.P. of Marketing and Sales for Key Source. "The ease with which we can integrate this technology allows us to use it with any input device, based on specific customers' needs. Many of our banking and financial market customers have asked us to produce security products, and the Biometric ID technology will enable us to respond to those requests."

All of Biometric ID's OEM modules are engineered to function with the leading silicon fingerprint sensors. As such, OEMs need not be concerned about re-enrolling fingerprints if they decide to change their sensor hardware, or require multiple types of sensors based on particular needs. With Biometric ID versatile fingerprint verification solutions, an original enrollment captured on one sensor is always maintained and employable in the event that verification is required on a sensor made by another leading provider.

For more information, contact Biometric Identification by phone at 818-501-3908, or visit the company's Internet Web-site at <http://www.biometricid.com>.

About Biometric Identification Inc. (Biometric ID)

Biometric ID is headquartered in Sherman Oaks, Calif. The company is an innovator in developing and integrating fingerprint authorization and verification technology. Biometric ID's revolutionary fingerprint verification algorithm, Ridge Recognition, leverages twenty years of experience in designing high-tech systems for the US Department of Defense. This patented algorithm computes a sophisticated data rich vector map of the fingerprint by adjusting for any distortion in the captured image with proprietary filtering techniques, and then analyzing the unique ridge and valley pattern of the finger. The filters applied in the process uniquely adjust for the effects of swollen, dirty, scarred or cut fingers -- the main pitfalls of minutia technology

About INGENICO

The world's largest provider of EFT-POS Smart Card based terminals, INGENICO Group is the Global Provider of Secured Payment Systems. INGENICO Group has been designing, manufacturing and marketing EFT-POS hardware (EFTPOS terminals, concentrators, cheque readers-writers) for 20 years. INGENICO Group has also developed a software library for the management of leading payment cards: Visa, Mastercard, American Express, Diners, JCB, Europay. Operating in the 5 continents, through its subsidiaries and its

distributors, the listed Paris-based INGENICO Group has developed a network of international customers. Ingenico is the Reference Shareholder of IVI Checkmate.

About Key Source

Headquartered in Hayward, Calif., Key Source International is a leading manufacturer of commercial grade Wireless and Point of Sale computer keyboards.

About TIPRO

Headquartered in Ljubljana, capital of Slovenia, TIPRO is dedicated to serving the niche market for specialist keyboards on a worldwide basis. Through integration of first class mechanical switches, strong engineering, and "in-house" manufacturing of most of its products, TIPRO maintains a commitment to high quality keyboard production without compromise. With introduction of its first programmable keyboard in 1989, the innovation as continuous "spiritus movens" of TIPRO was confirmed. This led to MID -- the Modular Input Device -- a truly unique product among keyboards currently on the world market. TIPRO currently serves customers throughout Europe, and also sells its products in Japan, Australia, and North and South America.

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When TV Hits Your Eye Like A Big Pizza Pie, That's Progress

Humankind's evolution through the Plastic Age continues. First came the use of credit cards in stores. Next, the added convenience of placing card orders by phone. Now, coming soon to a television screen near you, credit card purchases via TV where your set remembers your card number for you. And possibly, in time, debit card transactions on the small screen as well.

Reston, Va.-based TV Answer, developer of interactive home television systems will sell its wireless remote unit and a variety of services, from home banking to Dominos Pizza delivery. The unit itself will sell for about \$500 and will be marketed by Hewlett Packard starting in September.

Executives at the company have persuaded several corporations to hawk good and services once the network gets underway, and most items can be purchased by credit card. What's more, the consumer will never even have to touch the card after programming his or her card number into the TV box, which looks much like a videocassette recorder. A click of the remote control unit will send the credit card number to TV Answer's headquarters, via a network of local radio receivers and space satellites, and on to waiting merchants.

Specialty Sellers

The network's retail lineup so far is dominated by an assortment of specialty merchants, many of whom are accustomed to doing business over the telephone. These include 800 Spirits (alcohol); 800 Flowers; Bose Music Express (music catalog); Fusion Video (video tape catalog); Publishers Clearing House (magazine reseller) and Journal Graphics (TV show transcripts and videotapes).

Viewers also will be able to buy merchandise from selected portions of the JC Penney catalog and order specialized catalogs through their TV. Promotional items and sales items also will be continuously updated, giving the service more immediacy and flexibility than a printed catalog, says Mario Shaffer, TV Answer marketing representative.

TV Answer also has signed Ann Arbor, Mich.-based Domino's Pizza to deliver pizzas to TV Answer customers, although the trial area is yet to be selected and details of the contract are not public. Viewers will call up a menu of food items on their TV screens and use their remote control to

"point and click" their order. No telephone call to the restaurant will be necessary. The order will be transmitted to local radio receiving stations, beamed to satellite, relayed to TV Answer in Reston, then forwarded via a computerized facsimile service to a machine at a Domino's near the customer.

Convenience And Novelty

Although the complex process may seem like a Rube Goldberg solution, Domino's is hoping it will be worth the trouble. It believes TV devotees may be drawn by the convenience and novelty of the process, and since TV Answer is providing the facsimile machines, the chain will incur few start-up costs. Karen Shipman, national director of promotions and product development for Domino's, says the chain is discussing whether to accept credit card orders from TV Answer users. Domino's currently accepts credit cards only in a pilot in Texas, she says. The chain has no plans to take debit cards, Shipman says.

Domino's TV Answer test will probably take place in the Northeast, Shipman says, and the chain hopes to begin as soon as TV Answer goes live in September. But beyond the initial pilot, Domino's is making no plans. "We really want to take a look at the first phase before we make any kind of decision," Shipman says.

Still, the chain is optimistic about adding more areas. "It seem to be the new up-and-coming thing and seems to be a new avenue to get into the home," Shipman says. Domino's has an exclusivity agreement guaranteeing it to be the only pizza chain carried over TV Answer, she says. The company will pay TV Answer a transaction fee for every order but Shipman declined to say what it will be.

TV Answer also will offer viewers an electronic version of the catalog of New Windsor, N.Y.-based Harvest America, through which they can order nonperishable groceries for delivery directly to the home by delivery service or parcel post.

Certain banking services will be available from TV Answer as well. The service will feature a home bill-payment service managed by the Westerville, Ohio-based Check Free Corp. Reading, Penn.-based Meridian Bancorp. plans to offer a complete home banking service over the system and stands as the only bank that has committed definitely to TV Answer. Banking services will include balance inquiries and funds transfer initially and, in time, cleared-checks information, stop payment, check ordering and interest rates, says Bill DeLeo, director of business development of TV Answer. The bank will pay TV Answer a fee for every consumer transaction.

In addition, State Bank of Fetton, a \$180-million community bank near Flint, Mich., is considering joining TV Answer, says Carolyn Spicer, senior vice president for retail banking. Spicer, after reading a banking magazine advertisement for TV Answer's "Couch Potato Banking," looked into the service and decided it would fit into a convenience banking package that customers would like. Since many of State Bank's customers are husbands and wives who both work and don't have time to bank in branches, home banking

seems a sensible alternative, Spicer says.

"It's one thing we can do to compete with larger banks," she says.

TV Answer wants to offer all customers basic banking services, such as balance inquiry, regardless of where they bank, says Bill DeLeo, director of business development for TV Answer. TV Answer is talking to processors and regional ATM networks about this. One unresolved question is whether information encoded on the ATM card can be downloaded into the TV Answer box, making a banking transaction or debit purchase as fast and easy as a credit card purchase. Although entry of a TV Answer identification number will be required for any ATM or credit card transaction, in no case will viewers be required to swipe a mag-stripe card through a device on their TV set. One possible option being investigated is for each viewer's card data to be stored by a bank processor, which will forward the coded information to the bank for authorization, thereby eliminating a card swipe for every purchase, DeLeo says.

"We don't want to put a card swipe (reader) on the box," he says.

"We're all about convenience and I don't want people to have to go and put their card into the TV set."

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Retail Systems: No Longer Business as Usual
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ABSTRACT: Among the most critical changes a retailer must make to build its strength and guarantee its survival are those involving information and technology. In marketing, retailers can use systems to analyze external marketing information databases and to gather data about frequent and target customers. In the store, technology can expand a retailer's ability to offer customer service functions at the point of sale and at the point of decision. In merchandising, productive use and management of data enables retailers to perform quick response replenishment, continuous merchandise planning, and flow-managed distribution. To get the full benefits of technology changes, retailers should: 1. design their systems for desired results, 2. encourage user participation and accountability, 3. establish defined milestones and measures, 4. secure commitments early to develop a sense of urgency and momentum, and 5. maintain a sustained push from management.

TEXT: Among the most critical challenges a retailer must make are those involving information and technology. A visionary, yet practical strategy can position a retailer to use technology to meet its primary objective: knowing and serving its customers. Not only can information technology help retailers listen more closely to their customers, it also can enable improved quality and customer service. Information technology often carries with it the positive image of innovative leadership. But technology must do more than look good. Above all, it must be purposeful and integrated. Each addition to a retailer's technology plan must link with its existing systems to support a meaningful strategy formulated to meet specific challenges.

STRATEGIC FORCES A retailer's challenges come from various fronts. In particular, retailers are investing in improved technology to rise above the forces exerted by their consumers, competitors and vendors.

CONSUMERS. The weak economy has slowed consumer spending and resulted in flat market growth. But at the same time, consumers expect retailers to offer more convenience, greater value, improved service and increased quality. Retailers also face America's changing demographics: As the nation's

"graying" population and the "baby boomers" and their children rise in spending power, their lifestyles and buying patterns influence the retail business. Furthermore, consumers are demanding that retailers rise up to meet their environmental and wellness concerns.

COMPETITORS. In the 1980s, retail store operations flooded America. The amount of retail space in the United States has doubled since 1970; for every U.S. citizen, we have 18 square feet of retail space. And we are witnessing an ongoing shakeout of faltering organizations that cannot compete. The industry's leaders--who focus on building market share and differentiating themselves from others--are moving far ahead of the rest.

VENDORS. Retailers are beginning to establish strategic partnerships with their vendors, such as manufacturers, mills, wholesalers, distributors and carriers. As the market becomes more global, retailers must choose their partners from a broad array of vendors around the world. Battling continued cost pressures, they are encouraging vendors to help cut costs in the retail pipeline, eliminate wasted time and improve quality.

RESPONDING TO NEW DEMANDS To be responsive to these market forces, retailers need information systems that enable them to accurately predict and effectively react to trends. Traditionally, retailers have focused on organizational growth and expansion to new locations. But today's sluggish market dictates that retailers focus on the consumer, not the competitor; it is imperative that they shift their attention to who their current and potential customers are and how to reach them. This shift requires retailers to become smarter about collecting and using consumer information to generate profits.

Careful examination of data may show retailers that adding new stores is often not as profitable as shifting existing resources to better target sales. The right data could help determine how a retailer should reposition for greater profits. This data should communicate not only who customers are, but also where they are, what they need and how they spend. The key is to collect this information at the point of sale and process it quickly so it can be used to support the entire retail pipeline, beginning with the buying function and ending at the selling floor.

In marketing, retailers can use systems to analyze external marketing information databases and to gather priceless data about frequent and target customers, such as customer-specific transaction information. Through a variety of new technology applications, they can improve direct marketing skills and increase their capabilities to offer customers home shopping options. Most importantly, information systems can help retailers shift their focus from "what's selling" to "who's buying," and can create a process where consumers "pull" goods through the pipeline as they want

them, rather than having merchandise pushed at them by retailers and manufacturers.

In the store, technology can expand a retailer's ability to offer customer service functions at the point of sale (POS) and at the point of decision. Stores can install customer-operated service terminals for product information, gift registry and orders, or portable POS devices enabling sales associates to take the sales function to the customer or to ease the traffic problems of peak sales seasons. Retailers might also institute a technology-driven frequent shopper program that not only offers customers benefits, but also enables the organization to capture valuable shopper information to refine marketing efforts. Technology can be used as an information tool to empower personnel to make decisions regarding merchandising and customer service. Further, smart systems and workstation-based technology can strengthen the capabilities of the store-level management team.

Retailers must also strive for efficiency by ensuring that every business process is "value-driven." The goal is to work smarter: better, faster and cheaper. One means to this end is to use technology as a productivity tool that cuts waste and improves quality and value to the customer. For example, retailers traditionally have used a variety of replenishment techniques to get items as far as the store back room, but not all the way to the shelf. Quick Response technologies can help speed products to the shelf. But the information system that supports replenishment must be "smart" enough to do this, and the retailer needs a strong communications backbone to ensure information flows through these systems effectively.

In merchandising, productive use and management of data enables retailers to perform quick response replenishment, continuous merchandise planning and flow-managed distribution. They can implement systems to refine inventory management and restructure work to facilitate pooled clerical support. Through effective process reengineering, retailers can make buying more strategic, freeing the merchandiser's time to define the right merchandise for the market.

In logistics, information systems can help distribution centers manage the increased volumes needed to ship to every store everyday. Retailers can use advance shipment information to schedule and consolidate inbound and outbound freight and to automate material handling equipment. They can also reengineer processes to handle increased volumes of smaller transactions--a direct result of any move to Quick Response.

Retailers have begun to evolve strategic partnerships with vendors. Many retailers are implementing initial programs with first-tier vendors, and the leaders are moving toward additional, "deeper" vendor relations. All retailers expect these partnerships to improve their business and their

success with customers. While these relationships typically have been driven by the retailer, retailers and vendors now must cooperate to make their partnerships mutually successful. They must work toward a shared goal: anticipating, meeting and exceeding customer expectations. To do this, both members of a partnership must:

1. Secure senior management's commitment and establish mutual trust.
2. Facilitate communication between the companies across all functional areas (including sales and marketing, production, distribution, logistics, accounting and MIS)
3. Develop a mutual understanding of each other's business and culture.
4. Focus intently on early successes.
5. Work together to reengineer merchandise flow processes.
6. Implement enabling technologies, such as electronic data interchange (EDI), universal product codes(UPC) and shipping container marking(SCM).
7. Monitor performance and make ongoing efforts to improve.

To meet all these business challenges--for consumer-driven marketing, value-driven operations and strategic partnering --retailers can use information and technology. They must apply technology strategically to every facet of their business.

THE IDEAL TECHNOLOGY VISION To meet their business challenges today and tomorrow, retailers should look for opportunities to grow into the following key technology visions:

Computer systems that are as accessible as the telephone and provide users access through a variety of terminals. The location of both user and computer is becoming less and less important as an almost universal communications network bridges geographic gaps.

Natural computer interaction that mimics the user's human senses. The ultimate intuitive interface will feature multimedia communication, transmitting image, sound, full-motion video and text, employing both voice and handwriting recognition.

Smart systems that go beyond recording and reporting data to be intelligent "agents" that identify a wide array of actionable conditions. To support customer service, smart systems apply knowledge-based logic to suggest or take appropriate actions to conquer business inefficiencies.

New-age client/server architectures that can manage the proliferation of information and growing transaction volumes with a composite of scalable, open technologies,

TECHNOLOGY AT ALL ORGANIZATIONAL LEVELS All these technology visions have

direct application possibilities for retailers. Retailers must apply these technological "ideals" to systems that will help their personnel at all levels to better serve customers in the present and predict market demands to assure customer satisfaction in the future.

At the store level, retailers might apply technology in the form of wireless POS devices, a store manager's workbench, a work force scheduling system, computer-based training for store employees or customer information systems that capture and manage data to enable better marketing and merchandising.

At the distribution center, a retailer might use systems for the center's management, work force scheduling, freight optimization or material handling automation. Distribution centers can profit from paperless and portable systems and Quick Response interfaces that enable them to move goods at the right time, in the right amounts, to the right place.

At the corporate level, retailers might adopt technology to aid in merchandise planning, quick response replenishment, vendor relationship management, market analysis or promotion planning and execution. In addition to "workbench" applications for merchandisers, buyers and planners, the corporate organization could use multimedia electronic mail to improve communication with both internal personnel and external suppliers.

Technologies to Watch Several important technologies are emerging that retailers can implement to achieve their strategic goals. The following are among the technologies to watch in the retail industry:

MANAGEMENT WORKBENCHES. At the heart of any retail organization are its management users. For example, store managers need to be equipped with information that enables them to run not just an operation, but a business that may do millions of dollars in business each year. The store manager must be all things to all people--personnel manager, customer service manager, profit manager, local marketing manager, relationship manager and merchandiser. To free their time and improve their business capabilities, retail organizations must provide their store managers with smarter systems--exception-driven systems that can scrutinize problems and recommend solutions by giving actionable options. Workbench systems could classify merchandise by profitability contribution so the store manager can monitor a product's success, then choose from "best case" solutions for

those products that do not meet expectations.

New-age architectures, artificial intelligence and knowledge-based systems are among the tools that make these workbenches possible. Store managers can use artificial intelligence to focus their operational decisions. A store manager's workbench might feature a "to do" list, as well as the ability to monitor key performance indicators and perform what-if analyses. Store managers should be able to measure the buying habits of their frequent customers. Technology may also enable them with a space management tool that analyses the effectiveness of store ad shelf layouts, then prints out a display diagram for employees to follow when stocking shelves and arranging displays.

NEW-AGE SYSTEMS. New-age systems use intelligent workstations to provide solutions to business problems. They broadly encompass open systems, client/server and cooperative processing. Workstations will enable retailers to automate information gathering and delivery and to increase the flexibility and mobility of their work force. An open systems approach will link together previously incompatible hardware and software. Cooperative processing will change the way people work, letting them focus on the business rather than the underlying technology.

POS DEVICES. A variety of new POS devices are available that can not only collect information, but also help retail personnel manage information more easily and meet customer needs more quickly. For example:

A portable POS terminal scans the SKU (stock keeping unit) symbol on a product, features a credit card swipe for on-the-spot credit authorization or payment, and immediately produces a receipt. Such a device brings the checkout to the customer, eliminates checkout delay and is helpful in peak seasons and in such departments or businesses as lawn and garden and lumber.

A pen-based POS notepad helps reduce fraud by electronically capturing, recording and verifying signatures.

"Talking shelf tags" inform customers about products on display. The customer simply pushes a button to learn more about a product and make a more informed purchase decision. Not only is this technology informative, it makes shopping fun and relieves busy sales people.

A portable, pen-based notepad is used to survey customers leaving the store without a purchase. The customer answers open-ended questions such as "What do you like about our store?" and "Why didn't you buy anything today?" The system digitizes the respondent's answers, captures the information and enables the retailer to continuously improve, building the customer base by targeting unreached consumers.

ELECTRONIC DATA INTERCHANGE (EDI). EDI, which enables retailers to electronically transmit orders and a wide variety of other transactions, can help eliminate non-value-added processing--a critical move when a retailer processes millions of transactions each year. Establishing a department devoted to partnering and EDI processing is a wise investment.

If EDI is working well, it is invisible. Beyond ordering and invoicing applications, retailers can use EDI to help reengineer business processes with vendors, which can help the vendor improve planning, production and logistics, as well as generally improve the retailer/vendor relationship. The mutual benefits of sound retailer/vendor partnerships bolstered by EDI include improved sales and reduced costs for both parties.

COMMUNICATION NETWORKS. Because a retailer's information must flow throughout a dispersed network of stores, distribution centers, offices and even outside parties, communication networks are key. To present its best image to customers, a retailer needs information that is always up to date and technology that enables quick service. For example, customers asked to endure a long wait for credit card verification cause the check-out line to grow; when that line is long, people will begin to leave without purchasing.

Traditional terrestrial, or ground-based networks can support most of a retailer's basic communication requirements, such as credit and payment authorizations and EDI. But most retailers have other systems for voice, electronic mail, facsimile and image exchange. VSAT and ISDN networks, which exchange data in a variety of digital formats (data, video and voice) are taking up the increasing demands for multimedia information transmission and rapid data exchange and verification. The challenge for retailers is to implement an integrated, open communications network that supports all communication methods seamlessly, both within the retail organization and externally with vendors, carriers and financiers.

BAR CODE SCANNING TECHNOLOGY. The scanners used to collect SKU data are improving so item scanning is faster and more accurate. Once SKU data is scanned and entered into an information system, retailers can tie it to customer data to learn which products are selling to whom.

Another development in scanning technology is the two-dimensional bar code, which holds much more information than standard bar codes. A high-speed scanner reads the two-dimensional code in a zigzag pattern that covers the entire area of the code, as opposed to the one-dimensional method that simply scans once across a code. Thus, the two-dimensional bar code is essentially a portable data store that can carry much more than simple numeric identification information. It can hold data about what a product costs, where it came from, where it is going and how it should be handled.

en route.

RADIO FREQUENCY (RF) NETWORKS. To capture and verify data at distributed locations, retailers traditionally have used terminals with hard-wired communications lines, or they have used stand-alone devices that offer only limited verification and storage capacity. Wireless, RF communication provides retailers with data capture devices that are portable, powerful and allow real-time verification and update. The RF network enables the retailer to use hand-held devices to:

Change prices on the selling floor or in the store back room.

Record sales at the point of decision, then hold transaction information in the system until the customer reaches the register to pay.

Access information on sales statistics, customers and other stores directly from the selling floor.

Provide effective customer service, putting information in the hands of the sales associate.

CARD TECHNOLOGY. One of a retailer's most critical technology needs is for information systems at the point of sale to capture customer and sales information. Proprietary credit cards and frequent shopper cards can be a good source of consumer data. When one of these cards is "swiped" through an in-store POS device, the retailer can instantly capture information such as name and address and link it to the purchase decisions of the consumer. The issue of data privacy is alive and well in the minds of consumers, so retailers must be smart and thoughtful about how they use the data they gather. But the retailer can use this information to target specific marketing to each consumer.

Most of today's cards contain only static data. Transactional information must be stored at remote locations, increasing storage requirements and access time. The emerging breed of "smart" cards allows data to be stored, modified and accessed right on the card. Smart cards allow retailers to inexpensively and readily gain access to changing customer buying information.

ELECTRONIC TEST MARKETING. Test marketing is a traditional means of obtaining consumer feedback on merchandise, but it is expensive and time-consuming. To improve responsiveness, retailers can use information systems to design a range of products online, then share that design with customers and solicit their feedback electronically via in-store kiosk technology. In this way, before the product is even produced, the retailer can obtain consumer feedback to estimate demand for merchandise before making any commitment to vendors.

For example, a multimedia kiosk can be equipped to demonstrate product options to the customer, then invite the customer suggest changes, rank color, style ad fabric preferences ad even order products on the spot.

The key to successful implementation is that the technology provide value to the customer, such as product information to make an informed purchase decision, while collecting customer data for the retailer's marketing initiatives.

GEOGRAPHIC INFORMATION SYSTEMS. A geographic information system (GIS) is another tool that can enhance retail marketing. Combined with demographic databases that sort existing customers into such categories as lifestyle and region, a GIS pulls information from the point of sale, then plots both actual ad potential customers on a map." Using smart system technologies, the GIS then can advise a user with options and initiate the user's chosen action. To back up a user's selections, a GIS can even offer profit projections and stocking requirements to expect with each alternative. Applications of the GIS include determining where to go when changing store locations, learn the customer demographics of stores not meeting expectations. fine-tuning the merchandise mix, improving sales, maximizing the profitability of each existing store and examining the success of media advertising and direct marketing efforts.

FUTURE STRATEGIES As consumers demand more and more convenience, retailers will need to explore new avenues for business growth ad improved competitiveness. One valuable strategy will be non-store retailing. Non-store retailing is growing at a average rate of 25 percent each year. While it represents less than ten percent of total sales, high sales seasons such as holidays demonstrate the popularity of home shopping. Catalogs and home shopping networks could be a great source of revenue growth for retailers in the future.

Non-store retailing is changing--moving from massive, non-interactive, non-targeted catalogs to interactive and specific media like Prodigy/, which offers a home shopping service, but limited visual appeal. Televised home shopping programs have tremendous visual appeal, but allow little consumer interaction. An alternative that combines the best of both worlds will be the answer for non-store retailing.

Way down the line is "virtual reality" technology. Virtual reality will require more bandwidth, advanced chip technology and great graphics capability, but it will enable true home shopping. With virtual reality, a customer could "try on" hundreds of suits from stores around the world in a virtual environment, Retailers and their vendors will create and immediately deliver products on customer demand. For example, a technology

is now in development that will enable clothing retailers to offer made-to-order garments. This technology provides for the customer to be measured by laser and the clothing to be made to fit his or her exact specifications.

Meanwhile, in the realm of catalog retailing, direct marketers have moved to more specific catalogs that target consumers more carefully. To further improve, these marketers can use the data they collect to produce catalogs tailored to region or interest. The next step will be to tie the catalogs to customer information, tailoring each catalog to each consumer and his or her buying patterns.

THE EVOLUTION PROCESS Rather than a "big bang" approach, the key to migrating to these new technologies and systems is a phased approach that paces the changes to balance system reuse with system renewal. To get the full benefits of all changes, retailers must:

Design their systems for desired results.

Encourage user participation and accountability.

Establish defined milestones and measures.

Secure commitments early to develop a sense of urgency and momentum.

Maintain a sustained push from management,

When changing business processes to work more effectively and efficiently, retailers should focus on quality, speed and value. Above all, they should ask "What would the customer want us to do?" With the processes properly defined, a retailer can begin to apply technology that is appropriately scaled to the business and the application. Retailers must build information systems on proven, best of breed technologies and encourage extensive user participation throughout development.

By strategically evolving their systems to incorporate this new information technology vision, retailers will open themselves to improved business practices. Information systems can provide them with the power and flexibility to support consumer-driven marketing, value-driven operations and strategic partnering. Most importantly, retailers that make wise technology investments will be better equipped to meet and respond to the changing marketplace.

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Food Fair in North Carolina is the first supermarket chain in the country to use Ram Mobile Data's packet radio network to obtain credit card and debit card authorizations. The chain, based in Winston-Salem, selected Ram because the authorization process is dramatically faster than using a telephone line. Also, by eliminating an extra phone line, Ram will save each store hundreds of dollars annually.

The supermarket chain could increase its sales by several hundred thousand dollars a year by accepting credit cards. Based on national averages and Food Fair's own statistics, customers who pay with cash or a check typically spend \$19 on each trip to a grocery store, says Richard Messick, president of Food Fair. Customers who use a credit or debit card average \$47 to \$49 per visit, he says.

In addition to increasing the typical purchase, paying with "plastic" also reduces losses from bad checks. The grocery industry loses a huge amount of money from bounced checks. When a grocery store gets a confirmation number for a credit or debit card purchase, it is guaranteed payment, Messick says.

Food Fair operates 11 stores in North Carolina and generates revenues of \$15 million to \$20 million a year, he says. The company has offered payment via credit and debit cards for almost two years in one of its stores. Food Fair uses Verifone's Trans340 point-of-sale terminal (POS) connected to a telephone line and a printer.

For the tests with Ram, Food Fair uses another Verifone terminal connected to an Ericsson GE C719 radio modem. Unlike the portable, battery-powered Mobidem, the C719 is a relatively large unit that's designed to be plugged into a power supply. Messick has noticed an increase in revenues of about 2 percent in the store using the Verifone landline terminal for more than a year. "That (2 percent) doesn't sound like much, but in the grocery store industry that's a pretty big number," he says.

The increased revenues from customers using credit or debit cards occurs regardless of whether the authorization is transmitted via phone lines or a wireless network. But Ram's network decreases the speed of authorization from about 30 seconds to about 2 or 3 seconds, he says. "It's

unbelievable," Messick says, noting it takes longer to print the receipt than to obtain the authorization. "I don't see how you could get much faster, to tell you the truth." The manager of the Food Fair using the landline terminal has already told Messick he wants to switch to the Ram system. Now that Food Fair has completed its tests comparing landline with radio-based authorization, the supermarket chain will shortly install the Ram hardware in all its stores.

Faster authorizations make happier customers and faster checkout lines. The cost of the POS hardware is about \$7,000 for a phone line-based terminal and \$6,000 for a Ram-based terminal, Messick says. Because the Ram terminal connects to the host authorization terminal via radio, each Food Fair saves \$60 a month on the cost of a phone line. Spending money for phone lines "is just pure net profit going down the tubes," he says. With profit margins for grocery stores measured in a few percentage points, even \$60 monthly makes a difference.

Although the Ram system's hardware is less expensive and its speed is faster than landline POS systems, Food Fair still must pay fees to process each transaction. The authorization process is directed by the MasterCard Automated Point-of-Sale Program. Working with First Citizen's Bank, which recommended Ram, Food Fair pays 20 cents for each debit card transaction and 1 percent to 1.2 percent of each sale for credit card transactions. Messick expects the extra money spent by customers using credit or debit cards will more than make up for the hardware cost and ongoing transaction fees. Indeed, Messick says customers are beginning to select grocery stores based on whether they offer payments by credit cards and debit cards.

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